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FOREST INSECT SURVEY REPORTS

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ALASKA FOREST RESEARCH CENTER
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AN IPS INTERPUNCTUS INFESTATION IN WHITE SPRUCE OF NORTHERN INTERIOR ALASKA

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An aerial and ground survey of an Ips interpunctus (Eichh.) infestation in white spruce (Picea glauca (Moench) Voss) north of Fort Yukon was made in May and June of 1957. This infestation had been in existence for a number of years when first reported by W. F. McCambridge in 1955. 1/

The infestation was examined again in 1956, from the air, and partially mapped. 2/ After the 1956 survey, it was evident that a ground survey, combined with a more complete aerial mapping of the infestation, would be necessary before the situation could be adequately evaluated.

THE INFESTATION AREA

The infestation covers a wide area mostly along the Chandalar, Christian, Sheenjek, Coleen, and Porcupine Rivers, all tributaries of the Yukon River. It is confined almost entirely to pure stands of white spruce which occur as narrow bands a few miles wide and immediately adjacent to the rivers. This is a remote and roadless area, accessible from the major towns primarily by airplane.

SURVEY METHODS

Aerial survey.--In late May the infestation was flown and mapped from a Cessna 180 aircraft. This consisted of flying each of the major river drainages and locating the exterior boundaries of the outbreak. All adjacent drainages had been flown previously and were found to be outside of the infestation area.

1/ McCambridge, W. F. A summary statement of forest insect conditions in Alaska, season of 1955. Alaska Forest Research Center, Juneau, Alaska. November 10, 1955. Mimeo.

2/ Downing, G. L. Forest insect aerial survey, public domain lands, Interior of Alaska, August-September, 1956. Alaska Forest Research Center, Juneau, Alaska. October 12, 1956. File Report.

Ground survey.--The ground survey was limited almost exclusively to determining the trend of the infestation, coupled with obtaining information on the biology and habits of the insect involved.

During the mapping phase several areas were noted as suitable ground survey sites, i.e., within the outbreak area and accessible to amphibious aircraft. Four of these sites were used in the ground survey; one each on the middle fork of the Chandalar River, the east fork of the Chandalar River, the Sheenjek River, and the Porcupine River. The four survey sites were located thirty-five to sixty-five miles apart and across the breadth of the infestation area. Men and equipment were flown into each site in a Grumman "Goose" aircraft from Fairbanks.

At each site the three-man survey crew tallied tree losses on half-acre circular plots which were established by compass and pacing. The plots were spaced five chains apart on lines that were randomly spaced according to the various stand patterns encountered.

On each plot all currently infested and dead trees, five inches d.b.h. and larger, were tallied as: (1) currently infested, (2) dead one year, (3) dead two years, or (4) dead three to five years. Trees estimated as dead more than five years were not tallied because of the uncertainty involved in determining the cause of mortality. On every fifth plot the green trees were included in the tally. D.b.h. and height were recorded for all trees and several trees in each area were measured to determine the site class. This information was later used in computing volumes. From the four sampling sites a total of 135 half-acre plots were cruised and the beetle-killed trees tallied.

Observations on the habits of I. interpunctus were obtained from currently infested trees encountered while cruising the plots.

THE INSECT

I. interpunctus is a small bark beetle approximately one-eighth of an inch long and dark brown to almost black when mature. It is a typical Ips beetle with a "hollowed-out" posterior. The posterior end of the insect has four small but more or less prominent teeth.

From observations during this survey and from collection records on file at the Alaska Forest Research Center in Juneau a few comments can be made regarding the life history and habits of this insect in Alaska.

It readily infests weakened or dying white spruce within which it breeds in large numbers. Fire-weakened trees, windthrown trees, and trees dislodged and carried down-river by flood waters all serve as good host material. It is capable of infesting and killing apparently healthy green trees over large areas. It is believed that large-scale outbreaks in green timber result from I. interpunctus first breeding to large numbers in weakened and dying white spruce. This is a typical pattern for other related insects within this group.

I. interpunctus appears to have a one-year life cycle in Alaska, over wintering primarily in the adult stage. Eggs are laid from mid-May through June, with larvae appearing by early June. Pupae and new adults are known to occur by late July. Evidence of further development is confused by overlapping broods and possibly re-attacks. Seasonal development ends with the onset of low temperatures in mid-September.

Insect development occurs within the cambium of the tree where the egg galleries and the larval galleries are tunneled in the inner bark surface and the outer sapwood surface. The eggs are laid singly in small individual niches along both sides of the egg galleries. The egg galleries are usually two to three forked and originate at a central nuptial chamber. These galleries always run vertically with the grain of the tree. Individual sets of galleries are from five to nine inches long.

The larval galleries are constructed at a right angle to the egg galleries and are roughly one inch in length. The full grown larvae pupate and transform into adults at the ends of these galleries. Late season observations indicate that the adults overwinter in this position; however, no winter or spring observations are available. It is possible that the adults overwinter near the base of the tree where snow would afford some protection from the severe winter temperatures. This must be an exceedingly winter-hardy species, for temperatures in this area are frequently below -50° F. and are known to drop below -65° F.

It should be emphasized that these are preliminary results based on relatively few observations and will be subject to modification when more detailed studies are made.

THE INFESTATION TREND

The infestation covers a gross timbered acreage of 1,152,000 acres or 1800 square miles.

The small number of samples and the limited number of sampling locations were sufficient to indicate a decided downward trend of the infestation. Tree mortality appears to have been greatest two to five or more years ago, with a sharp decrease in losses during 1956 and 1957. It is apparent that this infestation has come to an end.

The small number of samples taken do not permit an accurate determination of volume losses. However, they indicate that a large volume of the available timber within the infestation area has been lost due to the activity of I. interpunctus.

Table 1.--Age and volume of white spruce loss caused by an Ips interpunctus outbreak in northern interior Alaska

	Currently infested (1957)	1-year-old loss (1956)	2-year-old loss (1955)	3-5-year-old loss (1952-54)	Total loss
Average cubic ft. vol./acre	0.3	2.3	9.2	28.5	40.3
Percent	0.7	5.7	22.8	70.7	100.0